

IN THE CLAIMS:

1. (Currently Amended) A process comprising:

a) combustion of a fossil fuel, thereby generating heat and a hot exhaust gas containing CO₂;

b) converting said heat into energy;

the process being characterized in that it comprises the steps of:

c) cooling said exhaust gas; and

d) reducing the amount of CO₂ contained in the cooled exhaust gas by biologically transforming said CO₂ into carbonated species; thereby obtaining a low CO₂ exhaust gas, wherein step d) comprises the steps of:

- catalyzing the hydration of at least a portion of the CO₂ contained in the exhaust gas and producing a solution containing hydrogen ions and carbonate ions; and wherein said hydration is catalyzed by the enzyme carbonic anhydrase or an analog thereof.

2. (Currently Amended) A process as defined in claim 1, wherein step d) comprises: characterized in that step d) comprises the steps of:

~~-catalyzing the hydration of at least a portion of the CO₂ contained in the exhaust gas and producing a solution containing hydrogen ions and carbonate ions; and~~

~~- adding to said solution metal ions, and adjusting the pH of the solution to precipitate a carbonate of said metal; ;~~

~~wherein said hydration is catalyzed by a biocatalyst capable of catalyzing the hydration of dissolved CO₂ into hydrogen ions and bicarbonate ions.~~

3. (Cancelled)

4. (Cancelled)

5. (Currently Amended) A process as defined in claim 12, wherein step d) comprises the step of:

- feeding liquid H₂O and at least a portion of the exhaust gas into a bioreactor containing therein a reaction chamber filled with said enzyme carbonic anhydrase or said analog thereof biocatalyst.

6. (Currently Amended) A process as defined in claim 5, characterized in that the enzyme carbonic anhydrase or said analog thereof biocatalyst is immobilized on solid supports packing the bioreactor.

7. (Currently Amended) A process as defined in claim 12, wherein step d) comprises the step of:

- feeding at least a portion of the exhaust gas into a bioreactor containing therein a reaction chamber filled with said enzyme carbonic anhydrase or said analog thereof biocatalyst in suspension in a liquid phase.

8. (Currently Amended) A process as defined in claim 7, characterized in that the enzyme carbonic anhydrase or said analog thereof biocatalyst is free in said aqueous liquid phase, or immobilized on solid supports or entrapped inside a solid matrix.

9. (Currently Amended) A process as defined in claim 21, characterized in that, in step c), the exhaust gas is cooled to a temperature sufficiently low so as to maintain a catalytic effect of the enzyme carbonic anhydrase or said analog thereof biocatalyst.

10. (Previously Presented) A process as defined in claim 1, characterized in that it comprises, prior to step d) of reducing, the step of:

- removing from the exhaust gas additional contaminants contained in the exhaust gas.

11. (Original) A process as defined in claim 10, characterized in that said additional contaminants are selected from the group consisting of ash, NO_x and SO₂.

12. (Original) A process as claimed in claim 2, characterized in that the metal ions are selected from the group consisting of calcium, barium, magnesium and sodium ions.

13. (Original) A process as defined in claim 12, characterized in that said metal ions are Ca++ and the carbonate is CaCO₃.

14. (Previously Presented) A process as defined in claim 1, characterized in that step c) of cooling is performed by means of a heat exchanger that removes heat from said cooled exhaust gas, the heat removed being recycled in step b) of the process.

15. (Currently Amended) A power plant comprising:

- a combustion unit for burning fossil fuel, thereby producing heat and an exhaust gas containing CO₂;

- means for converting said heat into energy;

the plant being characterized in that it comprises:

- means for cooling the exhaust gas;

- biological means for biologically transforming at least a portion of the CO₂ from the cooled exhaust gas into hydrogen ions and carbonate ions; and

- precipitation means for precipitating carbonated species from the carbonate ions,

wherein said biological means comprises a bioreactor including a reaction chamber filled with the enzyme carbonic anhydrase or an analog thereof to catalyze the hydration of dissolved CO₂ into hydrogen ions and bicarbonate ions.

16. (Original) A power plant as defined in claim 15, characterized in that said means for cooling the exhaust gas comprises a heat exchanger.

17. (Cancelled)

18. (Currently Amended) A power plant as defined in claim 15¹⁷, characterized in that the reaction chamber comprises:

- a liquid inlet for receiving an aqueous liquid;

- a gas inlet for receiving the cooled exhaust gas to be treated;
- a gas outlet for releasing a low CO₂ gas; and
- a liquid outlet for releasing a solution containing carbonate ions.

19. (Original) A power plant as defined in claim 18, characterized in that the precipitating means comprises:

- a precipitation vessel to react said bicarbonate ions with metal ions and precipitate a carbonate of said metal.

20. (Currently Amended) A power plant as defined in claim 18, characterized in that the enzyme carbonic anhydrase or the analog thereof biocatalyst is immobilized on solid supports packing the reaction chamber.

21. (Currently Amended) A power plant as defined in claim 18, characterized in that the enzyme carbonic anhydrase or the analog thereof biocatalyst is in suspension in an aqueous phase filling the reaction chamber.

22. (Currently Amended) A power plant as defined in claim 21, characterized in that the enzyme carbonic anhydrase or the analog thereof biocatalyst is free in said liquid phase, immobilized on solid supports or entrapped inside a solid matrix.